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October Precipitation Over the Great Lakes

As a percentage of the long-term October average:

Great Lakes Basin	161%
Lake Erie (including Lake St. Clair)	132%
Lake Superior	199%
Lakes Michigan-Huron	134%
Lake Ontario	214%

Note: These figures are preliminary.

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LEVEL news

Great Lakes St. Lawrence River Water Levels

Volume 3, Number 11 **November 6, 1995**

Opal Hits Lower Basin

Heavy October Rain on Great Lakes

After a relatively dry spring and summer over much of the area, the weather turned wet in October, bringing abundant water supplies to the Great Lakes system.

The effect of Hurricane Opal, and several other weather systems later in the month, slowed the decline in levels that typically occurs this time of year on all the lakes. Opal dropped up to 10 centimetres of rain on portions of Lake Ontario's basin. Lake Ontario's level moved from eight centimetres below average at the beginning of October to 11 centimetres above average by the end of the month.

The October rain has also put an end, for the foreseeable future, to the very low water level crisis at the Port of Montreal. Levels in the Port rose by over 50 centimetres from the beginning of October to the end of the month.

Lake Superior also saw its level rise, due to the third consecutive month of above average rainfall on its basin. Both Lakes Superior and Huron are presently very close to their seasonal averages. Lakes St. Clair and Erie are both currently about 12 centimetres above average.

While the impact on lake levels of the wet weather was evident, it was less than might have been anticipated for such a high amount of precipitation. This is probably due to the very dry conditions that existed over most of the basin at the beginning of October. A large portion of the rain was absorbed by the dry land and by inland lakes and wetlands, with the result that runoff to the Great Lakes was less than otherwise would have occurred.

Lake Superior may see very little change in its level in November, whereas the other Great Lakes are expected to decline the rest of this year. The threat of serious flood damage remains low due to present and expected water level conditions over the next several months.

Responses to Questions at Public Meetings

During five recent public meetings held by the International St. Lawrence River Board of Control, a number of questions were raised by the public on the

Summary information for "LEVEL*news*"

subject of Lake Ontario outflow regulation. As part of Environment Canada's goal to enhance public understanding of the subject, we have included in this issue some of the key questions raised, along with the answers provided by the Board.

We will be following the Board's next public meeting, scheduled for November 7 in Montreal, and will keep our readers updated on the results of that meeting.

1. Why doesn't the Board implement Regulation Plan 35P for Lake Ontario, a recommendation that came out of the IJC's Levels Reference Study?

Lake Ontario regulation is governed by criteria in the IJC's 1952 Order of Approval and its 1956 Supplementary Order. Plan 1958-D, the plan presently in place, was designed with these criteria in mind. The Board is testing the performance of Plan 35P, and another new plan called IS4, for three years before making a recommendation to the IJC. The testing is being performed considering the existing IJC criteria.

2. Why would the Board consider Plans 35P and IS4, when they favour new interests and would cause higher Lake Ontario levels?

These plans do not favour new interests. The intent of the designers of these plans was to maintain or enhance benefits to the long recognized interests, while providing benefits where possible to the newer interests. These plans, when tested with historical water supplies, result in slightly higher average levels but reduce the frequency of extreme flood levels on Lake Ontario and downstream compared to existing regulation.

3. Is the Board violating the Boundary Waters Treaty of 1909 when it considers other interests in the regulation of Lake Ontario?

The Board does not agree that consideration of interests other than those specifically mentioned in the IJC's criteria for Lake Ontario regulation would violate the Treaty. Consideration of other interests may result in revisions to the IJC's existing regulation criteria or the existing regulation plan. None of these revisions would specify raising the natural level of water which is a restriction of the Treaty, the natural level being that which would exist without regulation.

4. Why do water levels drop rapidly overnight under ice conditions on Lake St. Louis?

Ice formation restricts the flows and causes flow patterns to change, cutting off water to certain parts of the river. Sometimes it is necessary to reduce flows at the hydropower plant in order to promote formation of a stable ice cover. When this occurs, water levels downstream of the plant will drop.

5. What caused low levels in the Montreal area of the St. Lawrence River this year?

The low level conditions on Lake St. Louis and at the Port of Montreal

were mainly caused by low flows from the Ottawa River and other local tributaries, and somewhat less than average Lake Ontario outflows. These were the result of lower than average rainfall this year and a much lower than average spring snow melt.

6. Did the Board let too much water out of Lake Ontario in January and February this year?

Because of ice conditions in the St. Lawrence River, it is not always possible to release from Lake Ontario the exact amount specified by the regulation plan. Flows at times will be higher when ice conditions permit, to be followed by lower flows at a later time. Lake Ontario outflows in January this year were more than the amounts specified by the regulation plan. However, in early February when ice began to form in the river, flows were less than the amounts specified by the plan, offsetting the earlier deviations.

7. Why didn't the Board hold water back on Lake Ontario this spring to deal with low water levels later downstream on Lake St. Louis and at Montreal?

Early this year, the Board did retain some water on the lake. The stored water was used in September to help alleviate low level conditions in the Montreal area.

8. Can the dams in the Ottawa River be used to reduce flooding or raise low water levels in the Montreal area?

No, it is not possible, because the closest control dam does not have sufficient storage capacity to vary flows for the area. Most storage reservoirs in the Ottawa River system are located too far upstream from the Montreal area for this purpose.

9. Why do levels sometimes fall so rapidly in the St. Lawrence River upstream of Cornwall?

This is a result of high easterly winds causing a surge on Lake Ontario. Low levels at the eastern end of the lake result in low levels in the upper St. Lawrence River.

10. It appears that the Board has been regulating Lake Ontario levels to keep them in the upper half of the regulation range specified in the IJC's criteria. Why?

The fluctuation of Lake Ontario levels is largely dependent on the weather, with regulation having a limited control. Lake levels have been high because of high water supplies to the lake, and low supplies will cause low levels. Since Lake Ontario regulation began in 1960, water supplies to the lake have been higher than average due to generally higher than average precipitation on the Great Lakes basin. For this reason, the long-term mean levels since 1960 tend to be slightly higher than the average prior to 1960.

Lake Erie, which is not regulated and provides about 85% of Lake Ontario's supply, also experienced higher levels during the past 35 years than prior to 1960.

11. What have been the actual Lake Ontario levels, before

and after regulation?

While many factors have affected lake level fluctuations in the post- and pre-regulation periods, comparison of the monthly mean data before and after 1960 shows the following: the long-term average during the period 1918-1959 on Lake Ontario was 74.70 m (IGLD 1985), with the monthly mean values ranging from a high of 75.76 m to a low of 73.74 m. In the post-regulation era (since 1960), the long-term mean value is 74.80 m, with a maximum monthly mean value of 75.73 and a minimum value of 73.83 m. The average seasonal range was 48 cm prior to regulation, and 55 cm since 1960.

The slightly higher long-term mean level in the post-regulation era is due to higher water supplies to Lake Ontario since 1960. The post regulation period supplies are about 10% more than those prior to 1960. Lake Erie also had the same pattern and that lake is unregulated.

12. Why does the Board propose to raise Lake Ontario levels to 248 feet (75.6 m) IGLD 1985, from April 1 to October 1, knowing this would cause flood damage on the lake?

There has been no Board proposal to raise the lake to this level. This was one of many requests made to the Board during the public consultation process, some calling for higher levels and others calling for lower levels.

13. If the Board did not intend to raise the lake level, why was the revetment at the United States Coast Guard Station at Rochester, New York, built so high?

The need for the structure came about as a result of a 1992 storm surge event. At that time, the waters of Lake Ontario were driven ashore by hurricane force northeasterly winds. The station itself sustained flood damage and the accompanying wave action nearly destroyed an existing boathouse. The revetment is designed to protect against future storm surge events similar to the one that occurred in 1992. It was not designed in anticipation of any managed increase in the water surface elevation of Lake Ontario.

14. Why can't the Board keep Lake Ontario levels lower in the fall to make room for spring runoff?

The natural seasonal water supply cycle to Lake Ontario typically causes higher levels in June or July, followed by declining levels until December or January. Regulation preserves this cycle and also makes room on the lake for spring runoff.

Unless there is a great risk of very high levels in the spring, Lake Ontario should not be drawn down by any more than under normal conditions. If the winter turns dry, excessive lowering of the lake will lead to low levels the following spring.

15. Why can't the Board regulate Lake Ontario to near long-term average?

Regulation Plan 1958-D was designed to regulate Lake Ontario's levels and outflows to meet criteria established by the IJC. These

criteria aim to provide benefits to the interests, or to provide them protection from extreme high or low levels and flows. Maintenance of long-term mean levels for Lake Ontario at all times is not the objective of regulation, nor would it be achievable without wide fluctuations in flows of the St. Lawrence River. Such flows would be detrimental to many interests, including hydropower, seaway navigation, recreational boating in the river and riparians downstream.

16. Why don't we regulate Lake Erie so that we can have tighter control for Lake Ontario?

There are no facilities to control Lake Erie's outflows. Recent IJC studies have recommended against Lake Erie regulation on the basis of costs and adverse environmental impacts.

If Lake Erie were regulated, it would not likely result in "tighter control" of Lake Ontario, since interests on Lake Erie would want to vary outflows to meet their needs, resulting in the potential for a larger variation in Lake Ontario levels.

17. Why don't we alter Long Lac/Ogoki and Chicago diversions to better manage Lake Ontario levels?

Because of their distant location relative to Lake Ontario, it is impossible to vary these diversions to provide a timely response to the ever changing water supplies to Lake Ontario. Secondly, variations in these diversions only result in very small changes in the total water supplies to Lake Ontario. Lastly, altering these diversions will have significant adverse impacts on their respective local systems.

18. The IJC's Criterion (j) sets a minimum Lake Ontario level for April 1. Why is there no criterion for a maximum on April 1?

The reason for Criterion (j) is to ensure adequate levels on Lake Ontario for the start of the navigation season. Although no maximum was set, the need to avoid monthly mean levels above the Criterion (h) level of 75.37 metres IGLD 1985 on Lake Ontario at any time reduces the potential for high levels on April 1.

19. What is the definition of low levels in the IJC's Orders of Approval and regulation criteria?

Low levels are usually considered those that would adversely impact intakes for water supply and commercial navigation on Lake Ontario and the St. Lawrence River. There are presently no low levels provisions related to recreational boating in the IJC's Orders of Approval or regulation criteria.

20. Did adoption of the new International Great Lakes Datum of 1985 raise Lake Ontario levels six inches?

The new datum did not raise lake levels, it simply assigned a more accurate and up-to-date measurement of the shoreline and lake level elevations relative to sea level. The datum change did not raise the level of the lakes relative to the shoreline. The new elevation values assigned within the new datum were also assigned to the figures in

the regulation criteria and regulation plan.

21. The Board kept Lake Ontario levels too high in the fall of 1992; the result was extensive flood dam-age in 1993. Why didn't the Board react sooner?

In September and October of 1992, the Board reduced Lake Ontario outflows to facilitate repairs at the Moses-Saunders hydropower plants at Cornwall, Ontario and Massena, New York, and at the Beauharnois-Cedars hydro complex near Montreal. Secondly, these actions also helped recreational boaters in the Lake Ontario-Thousand Island area as the boating season had not ended. The water retained on Lake Ontario from this action resulted in a 10 cm rise on Lake Ontario. However, this water was completely released from Lake Ontario by the end of the year through higher outflows.

The very high water level conditions on Lake Ontario in 1993 were caused by a combination of several factors. Lake Ontario in January 1993 received record high water supplies for the month, while in April the lake received an all-time high record water supply. Severe ice conditions in the St. Lawrence River also reduced its flow capacity for much of the winter. In spite of the difficulties, the Board was able to release flows from Lake Ontario in the winter and spring that were much higher than specified by the regulation plan, resulting in Lake Ontario levels being 24 cm lower than under the plan, and 36 cm lower than would have occurred without regulation.

22. Would lower Lake Ontario levels help with beach replenishment?

The recently completed Levels Reference Study examined the relationship between lake levels, shore protection, shoreline types, and coastal processes. For some of the Lake Ontario shoreline, there is little impact of changing water levels on long-term erosion rates. In the case of beach replenishment, if the source of the beach's sand is interrupted, then lower lake levels will have no impacts. Also, if the shoreline being eroded has clay, the material will not be replaced at any water level.

23. How does a wider range of lake levels help wetlands?

A range of water levels is necessary for a healthy, sustainable wetland. Periodic flooding and drying of wetlands ensures a succession of a variety of vegetation types, providing a diversity of wildlife habitat.

24. Would improved long-term weather forecasts help in management of levels and flows?

Climate experts around the world are working hard on this subject and the Board would welcome any technologies that would aid in managing levels and flows in the system.

25. How does the Board make its decisions?

The Board constantly assesses the hydrologic conditions in the Great Lakes-St. Lawrence River system. The Lake Ontario outflows are usually as specified by the regulation plan, but the Board also has discretionary authority to direct higher or lower flows. Decisions to

deviate from the regulation plan are made only after careful assessment of conditions throughout the system, and taking into consideration the needs of all users and interests.

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